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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,433	12/19/2005	Jurgen Schulz-Harder	A-9800	6344

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EXAMINER

SMITH, COURTNEY L

ART UNIT PAPER NUMBER

2835

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/561,433	<b>Applicant(s)</b> SCHULZ-HARDER ET AL.	
	<b>Examiner</b> COURTNEY L. SMITH	<b>Art Unit</b> 2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-27, 29-34, 36-44, 46, 47 and 49-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-27, 29-34, 36-44, 46, 47 and 49-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☒ None of:
- ☒ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/19/2005</u>  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-12, 14-25, 27, 29-34, 36-44, 46-47, 49-58**, are rejected under 35 U.S.C. 103(a) as being unpatentable over **Matabayas 2005/0061496**.

**Regarding Claims 1, 27, 36**, Matabayas discloses an apparatus (**Fig. 2**) with a heat source comprising at least one electronic component (**110**) with a heat sink (**106**) and with an intermediate layer/thermal mass (**204**) made of a thermally conductive material (**Detailed Descriptions--0020**) provided between the heat source and the heat sink, wherein the intermediate layer consists of an organic matrix (**Detailed Descriptions--0024**) with embedded nanofibers (**310-Fig. 3c**), the length of at least a majority of the nanofibers embedded in the organic matrix is between 1-100 micrometers (**Detailed Descriptions--0024**). **Except**, Matabayas does not explicitly disclose surface pressure of the intermediate layer between approximately 0.1 and 100 bar. It would have been obvious to one having ordinary skill in the art at the time the invention was made to , since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

**Regarding Claims 2, 37, Matabayas** discloses an apparatus (**Fig. 2**) to claim 1, wherein the organic matrix, at least at the operating temperature of the apparatus or of the heat source is in a semi-liquid state (**Detailed Descriptions—0024; wherein nanotubes may be treated with surface modifications to improve wetting**).

**Regarding Claims 3-4, 38-39, Matabayas** discloses an apparatus (**Fig. 2**) to claim 2, wherein the organic matrix is already in the liquid state, **except** explicitly being at a temperature between 0 and 30°C, or a temperature higher than 30°C, or at a temperature between 40 and 80°C. It would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the apparatus temperature range, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

**Regarding Claims 5, 40, Matabayas** discloses an apparatus (**Fig. 2**) to claim 1, wherein the organic matrix contains at least one oil, such as a silicone oil (**Detailed Descriptions--0039**).

**Regarding Claims 6, 41, Matabayas** discloses an apparatus (**Fig. 2**) characterized in that claim 1, wherein the organic matrix contains at least partially an elastomer, such as a completely or only partially cross-linked elastomer (**Detailed Descriptions--0043**).

**Regarding Claims 7, 42, Matabayas** discloses an apparatus (**Fig. 2**), characterized in claim 1, wherein the organic matrix is at least partially polypropylene (**Detailed Descriptions--0043**).

**Regarding Claims 8, 43, Matabayas** discloses an apparatus (**Fig. 2**), according to claim 1, wherein the percentage of nanofibers in the matrix is between 1 and 70 percent by weight in relation to the total mass of the intermediate layer (**Detailed Descriptions--0043**).

**Regarding Claims 9, 44, Matabayas** discloses an apparatus (**Fig. 4--Detailed Descriptions--0032**) according to claim 1, wherein the nanofibers have a thickness between approximately 1.3 nm and 300 nm, where the length/thickness ratio of a majority of the nanofibers embedded in the organic matrix is greater than 10.

**Regarding Claims 11, 46, Matabayas** discloses an apparatus (**Fig. 2**) according to claim 1, wherein the thickness of the intermediate layer is between 0.01 mm and 0.5 mm (**Detailed Descriptions--0040**).

**Regarding Claims 12, 47, Matabayas** discloses an apparatus (**Fig. 2**) according to claim 1, wherein at least part of the nanofibers are made of boron nitride (**Detailed Description 0044**).

**Regarding Claims 14, 49, Matabayas** discloses an apparatus (**Fig. 2**) according to claim 1, wherein the nanofibers in the organic matrix are oriented in a random configuration (**Detailed Descriptions 0027**).

**Regarding Claims 15, 50, Matabayas** discloses an apparatus (**Fig. 2**) claim 1, wherein the nanofibers in the organic matrix at least for the most part are oriented perpendicular to the heat transfer surfaces (**as depicted in Fig. 3c**).

**Regarding Claim 16, Matabayas** discloses an apparatus (**Fig. 2**) according to claim 15, further comprising means for orienting and/or maintaining the orientation of the nanofibers in the organic matrix, by means for creating an electric field (**Detailed Descriptions 0046**) intensity in the organic matrix.

**Regarding Claims 17, 51, Matabayas** discloses an apparatus (**Fig. 3c**) claim 1, wherein at least part of the nanofibers embedded in the organic matrix form a two-dimensional or three-dimensional structure, in which the nanofibers are linked with each other, in the form of a network (**Detailed Descriptions 0029**).

**Regarding Claims 18, 52, Matabayas** discloses an apparatus (**Fig. 2**) claim 1, wherein the organic matrix contains further components or additives, in a percentage that is lower than the percentage of nanofibers (**Detailed Descriptions 0035**).

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**Regarding Claims 19, 53, Matabayas** discloses an apparatus (**Fig. 2**) to claim 18, wherein the organic matrix contains at least one thermally conductive BN ceramic in the form of fine particles or powder as an additive (**Detailed Descriptions 0037**).

**Regarding Claims 20, 23, 54, 57, Matabayas** discloses an apparatus (**Fig. 2**) to claim 18, wherein the organic matrix contains as an additive at least one metal and/or metal compound and/or metal alloy in the form of fine particles or powder of silver (**Detailed Descriptions 0037**).

**Regarding Claims 21, 55, Matabayas** discloses an apparatus (**Fig. 2**) claim 18, wherein the matrix contains as an additive, in the form of fine particles or powder, at least one material and/or material compound and/or alloy that is heat-conductive, **except** explicitly disclosing the material changes to molten state at temperatures above 50°C. It would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the set point at which the material changes to a molten state, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

**Regarding Claims 22, 56, Matabayas** discloses an apparatus (**Fig. 2**) characterized in that claim 1, wherein at least part of the nanofibers are nanotubes, for example double-walled nanotubes (**Detailed Descriptions 0024**).

**Regarding Claims 24, 58, Matabayas** discloses an apparatus (**Fig. 2**) characterized in that claim 1, wherein the nanofibers made of carbon are such nanofibers that were subjected before being embedded in the organic matrix to a heat treatment (**Detailed Descriptions 0034**), **except** explicitly disclosing treatment at a temperature between 2700 - 3100°C. It would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the set point at which the material changes to a molten state, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

**Regarding Claim 25, Matabayas** discloses an apparatus (**Fig. 2**) characterized in that claim 1, wherein the heat source is formed by at least one electronic component, such as IC (**Background of Invention 0004**).

3. **Claim 26** is rejected under 35 U.S.C. 103(a) as being unpatentable over (**Matabayas 2005/0061496**) as applied to claim 1 above, in view of (**Eckblad 6,407,922**).

**Regarding Claim 26, Matabayas** discloses an apparatus (**Fig. 2**) characterized in that claim 1, wherein the heat source is formed by at least one circuit or module with at least one electronic component which is located on a metal substrate (**metal substrate necessitated by soldering—Background of Invention 0005**) wherein the



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intermediate layer is located between one metallization ("**IHS**"-**106**) of the substrate and one heat transfer surface (**102**) adjacent to said metallization, **except** explicitly disclosing that the metal substrate includes ceramic. However, **Eckblad** discloses a metal and ceramic substrate (**flip chip substrate-6 and multilayered ceramic board 9, Fig. 1—Col. 6, lines 1-8**). It would have been obvious to one having ordinary skill in the art at the time that the invention was made to provide the apparatus of Matabaya with the metal-ceramic substrate of Eckblad in order to allow for an increased ability to spread heat; whereby having more reliability and reduced weight and/or leakage in comparison to the use of all metal which may require fluid systems to spread heat.

**Regarding Claim 29, Matabayas** discloses an apparatus (**Fig. 2**) according to claim 1, wherein the heat sink is formed by a passive cooler with cooling fins (**102**).

**Regarding Claims 30-32, Matabayas** discloses an apparatus (**Fig. 2**) according to claim 1, wherein the heat sink comprises at least one active cooler through which a coolant (**Detailed Descriptions 0023**) circulates.

**Regarding Claims 33-34, Matabayas** discloses an apparatus (**Fig. 2**) according to claim 32, wherein the heat pipe, wherein-at least one intermediate layer (**202**) is provided between the heat pipe and a heat exchanger (**106**).

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to COURTNEY L. SMITH whose telephone number is (571)272-9094. The examiner can normally be reached on Monday-Friday 7:30a-5p (1st Fri. off).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jayprakash Gandhi can be reached on 571-272-3740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Courtney L Smith  
Examiner  
Art Unit 2835

/C. L. S./

**BORIS CHERVINSKY**  
**PRIMARY EXAMINER**

  
1/30/3